

- 1 1. A method comprising:
2 forming a metal oxide semiconductor field effect
3 transistor having an epitaxially deposited source/drain
4 that extends under the edges of a gate electrode.

- 1 2. The method of claim 1 including forming a
2 source/drain extension that extends under the edges of a
3 gate electrode.

- 1 3. The method of claim 1 including forming a
2 sacrificial epitaxially deposited material over a substrate
3 and forming a gate electrode over said epitaxially
4 deposited layer.

- 1 4. The method of claim 3 wherein forming a
2 sacrificial epitaxially deposited material includes
3 epitaxially depositing a silicon material.

- 1 5. The method of claim 3 including selectively
2 etching said epitaxially deposited material.

- 1 6. The method of claim 5 including using sonication
2 to selectively etch said material.

1 7. The method of claim 3 including forming a
2 sidewall spacer on said gate electrode and etching under
3 said sidewall spacer.

1 8. The method of claim 5 including selectively
2 etching said epitaxially deposited material so as to
3 undercut said gate electrode.

1 9. The method of claim 8 including depositing an
2 epitaxial material on said substrate and extending under
3 said gate electrode.

1 10. The method of claim 9 including forming a doped
2 epitaxial material.

1 11. The method of claim 8 including forming said
2 epitaxial material to be thinner near the gate electrode
3 and thicker spaced from said gate electrode.

1 12. The method of claim 1 including forming a delta
2 doped transistor.

1 13. A field effect transistor comprising:
2 a substrate;
3 a doped epitaxial semiconductor material formed
4 over said substrate; and

5 a gate electrode formed over said doped epitaxial
6 semiconductor material, said doped epitaxial semiconductor
7 material extending under said gate electrode.

1 14. The transistor of claim 13 including a
2 source/drain having a source/drain extension, said
3 source/drain extension being formed of said doped epitaxial
4 semiconductor material and extends under the edges of the
5 gate electrode.

1 15. The transistor of claim 14 wherein said material
2 has a first thickness near said gate electrode and a second
3 thickness spaced from said gate electrode, said second
4 thickness being greater than said first thickness.

1 16. The transistor of claim 15 including a sidewall
2 spacer, said material extending under said sidewall spacer.

1 17. The transistor of claim 16 wherein said second
2 thickness is aligned with said sidewall spacer.

1 18. The transistor of claim 13 wherein said
2 transistor is a delta doped transistor.

1 19. The transistor of claim 13 including an ion
2 implanted source/drain under said doped epitaxial
3 semiconductor material.

1 20. A method comprising:
2 forming a epitaxial semiconductor layer over a
3 semiconductor substrate wherein the epitaxial semiconductor
4 layer has a lower doping concentration than the substrate;
5 forming a gate structure including a gate
6 electrode and a sidewall spacer over said epitaxial
7 semiconductor layer; and
8 selectively etching the exposed portion of said
9 epitaxial semiconductor layer as well as a portion of said
10 epitaxial semiconductor layer under said gate electrode.

1 21. The method of claim 20 including epitaxially
2 depositing a doped semiconductor material over said
3 substrate to fill the region under said gate electrode and
4 under said sidewall spacer.

1 22. The method of claim 21 wherein said epitaxial
2 semiconductor layer has a first thickness under said gate
3 electrode and a second thickness spaced from said gate
4 electrode.

1 23. The method of claim 22 including forming said
2 second thickness in alignment with said spacer.

1 24. The method of claim 20 including forming a deep
2 source/drain region by ion implantation.

1 25. The method of claim 20 including forming said
2 epitaxial semiconductor layer extending under said gate
3 electrode and having a greater thickness outbound of said
4 gate electrode and a lesser thickness under said gate
5 electrode.